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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
HO, ALLEN C	

ART UNIT	PAPER NUMBER
2882	

DATE MAILED: 06/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/064,541	ARENSON ET AL.	
	Examiner	Art Unit	
	Allen C. Ho	2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 May 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,5-13,17,18,21-29 and 32-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,5-13,17,18,21-29 and 32-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 33 and 35 are objected to because of the following informalities: Claims 33 and 35 use the phrase "adapted to". Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 2, 5-12, and 32-36 are rejected under 35 U.S.C. 102(b) as being anticipated by Gono *et al.* (U. S. Patent No. 5,873,826).

With regard to claim 1, Gono *et al.* disclosed a method for reducing radiation exposure from an imaging system adapted to provide a radiation distribution about an object cavity during a scan, the method comprising the steps of: determining an entry location (between ϕ_1 and ϕ_2) representative of a location of a hand (h); operating the imaging system so as to cause the imaging system to emit radiation (**1b**) having a radiation intensity and an angular radiation distribution (Figs. 9 and 10) comprising a first angular radiation distribution suitable for a 360 degree image reconstruction and a second angular radiation distribution suitable for a 180 degree image reconstruction (column 5, lines 31 to column 6, lines 1-15), the first angular radiation distribution having a first average radiation distribution (inherent, since an average can always be

calculated for a distribution), the second angular radiation distribution having a second average radiation distribution (inherent, since an average can always be calculated for a distribution), the first and second angular radiation distribution vary in intensity throughout the scan (column 6, lines 1-15), and the first and second average radiation distributions being about constant throughout the scan (an average is a constant); controlling (**4**) the radiation intensity in a manner responsive to the entry location so as to create image data (see steps shown in Fig. 4); and processing the image data to create processed image data (column 4, lines 15-17).

With regard to claim 2, Gono *et al.* disclosed the method of claim 1, wherein the determining step includes determining the entry location (in terms of gantry angular range of the x-ray source) relative the imaging system.

With regard to claim 5, Gono *et al.* disclosed the method of claim 1, wherein the entry location is determined in a manner responsive to a FluoroCT scan (column 1, lines 38-42).

With regard to claim 6, Gono *et al.* disclosed the method of claim 1, wherein the imaging system includes an object cavity (inherent for a CT) and a radiation source (**1b**) having a gantry angular position (ϕ), wherein the radiation source is rotatably associated with the imaging system so as to rotate around the object cavity, and wherein the entry location includes an entry angular range (between ϕ_1 and ϕ_2).

With regard to claim 7, Gono *et al.* disclosed the method of claim 6, wherein the operating step includes operating the imaging system so as to cause the radiation source to rotate around the object cavity (inherent for a CT).

With regard to claims 8 and 9, Gono *et al.* disclosed the method of claim 6, wherein the controlling step includes controlling the radiation intensity such that the radiation intensity is

decreased by a predetermined minimization amount when the gantry angular position is within the entry angular range (Fig. 9), wherein the predetermined minimization amount is equal to the radiation intensity (corresponding to a tube current of 200 mA).

With regard to claim 10, Gono *et al.* disclosed the method of claim 6, wherein the controlling step includes controlling the radiation intensity such that the radiation intensity is increased by a predetermined minimization amount (corresponding to a tube current of 200 mA) when the gantry angular position is within 180 degrees of the entry angular range (Fig. 9).

With regard to claim 11, Gono *et al.* disclosed the method of claim 6, wherein the controlling step includes controlling the radiation intensity such that the radiation intensity is increased by a predetermined minimization amount (corresponding to a tube current of 200 mA) when the gantry angular position is within 90 degrees of the entry angular range (Fig. 9).

With regard to claim 12, Gono *et al.* disclosed the method of claim 6, wherein the operating step includes operating the imaging system so as to determine a radiation absorption angular profile (x-ray absorption/attenuation data for 3D reconstruction), wherein the radiation absorption angular profile is responsive to the gantry angular position (This is inherent, since this is what a CT is designed to do).

With regard to claim 32, Gono *et al.* disclosed a method for reducing a physician's radiation exposure from an imaging system while maintaining patient dose and image quality comprising: obtaining an object to be scanned; operating the imaging system so as to create image data; displaying (**20**) the image data on an output device; and processing the image data using a processing device (**20**), wherein the processing device: determines an entry location representative of a location of a physician's hand (between ϕ_1 and ϕ_2); operates the image system

so as to cause the image system to emit radiation having a radiation intensity and an angular radiation distribution comprising a first angular radiation distribution suitable for a 360 degree image reconstruction and a second radiation distribution suitable for a 180 degree reconstruction (column 5, lines 31 to column 6, lines 1-15), the first angular radiation distribution having a first average radiation distribution (inherent, since an average can always be calculated for a distribution), the second angular radiation distribution having a second average radiation distribution (inherent, since an average can always be calculated for a distribution), the first and second radiation distributions varying in intensity throughout the scan (column 6, lines 1-15), and the first and second average radiation distributions being constant throughout a scan (an average is a constant); controls the radiation intensity in a manner responsive to the entry location so as to create image data; and processing the image data so as to create processed image data.

With regard to claims 33 and 35, Gono *et al.* disclosed a system for reducing the physician's radiation exposure from an imaging system while maintaining patient dose and image quality comprising: a gantry (**10**) having an x-ray source (**1b**) and a radiation detector array (**2a**), wherein the gantry defines a patient cavity, and wherein the x-ray source and the radiation detector array are rotatingly associated with the gantry so as to be separated by the patient cavity; a patient support structure (necessary for supporting the patient) movingly associated with the gantry so as to allow communication with the patient cavity; and a processing device (**20**), wherein the processing device: determines an entry location representative of a location of a physician's hand (between ϕ_1 and ϕ_2); operates the image system so as to cause the image system to emit radiation having a radiation intensity and an angular radiation distribution comprising a

first angular radiation distribution suitable for a 360 degree image reconstruction and a second radiation distribution suitable for a 180 degree reconstruction (column 5, lines 31 to column 6, lines 1-15), the first angular radiation distribution having a first average radiation distribution (inherent, since an average can always be calculated for a distribution), the second angular radiation distribution having a second average radiation distribution (inherent, since an average can always be calculated for a distribution), the first and second radiation distributions varying in intensity throughout the scan (column 6, lines 1-15), and the first and second average radiation distributions being constant throughout a scan (an average is a constant); controls the radiation intensity in a manner responsive to the entry location so as to create image data; and processing the image data so as to create processed image data.

With regard to claims 34 and 36, Gono *et al.* disclosed the system of claims 33 and 35, wherein the imaging system is a computed tomography imaging system.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 17, 18, and 21-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gono *et al.* (U. S. Patent No. 5,873,826) in view of Zmora (U. S. Patent No. 6,028,909).

With regard to claims 17, 18, 21-28, Gono *et al.* disclosed the method of claims of 1, 2, and 5-12. However, Gono *et al.* failed to teach a medium encoded with a machine-readable computer program codes that implement the method of claims 1, 2, and 5-12.

Zmora disclosed a method for CT imaging in the form of a computer readable medium. Zmora taught that a method for a computer-based system could be carried out using software, which could be upgraded as needed (column 8, lines 24-29).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide the method in the form of a computer program stored on a computer-readable medium, since a person would be motivated to modify and/or improve on the method as needed.

6. Claims 13 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gono *et al.* (U. S. Patent No. 5,873,826) and Zmora (U. S. Patent No. 6,028,909) as applied to claims 12 and 18 above, and further in view of Popescu (U. S. Patent No. 5,822,393).

With regard to claims 13 and 29, Gono *et al.* in combination with Zmora disclosed the method and the medium of claims 12 and 28. However, Gono *et al.* in combination with Zmora failed to teach controlling the imaging system so as to modulate the radiation intensity in a manner responsive to the radiation absorption angular profile.

Popescu disclosed a CT system and method that modulates the radiation intensity in a manner responsive to the radiation absorption angular profile (column 6, lines 6-17). Popescu taught the method keeps the minimum x-ray intensity above the noise level, so that a noise-free image can be reconstructed (column 5, lines 38-53).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modulate the radiation intensity in a manner responsive to the radiation absorption angular profile, since a person would be motivated to obtain a noise-free image for diagnosis.

Response to Arguments

7. Applicant's arguments filed 14 May 2004 have been fully considered but they are not persuasive.

Applicants argue that Gono *et al.* failed to teach that the first and second angular radiation distributions vary in intensity through the scan, and the first and the second average radiation distributions being about constant throughout the scan. The examiner respectfully disagrees. A varying radiation distribution is clearly disclosed by Gono *et al.* in Fig. 10. Gono *et al.* taught that a maximum value and a minimum value of the x-ray tube current could be specified, the x-ray tube current, and therefore the radiation intensity, is smoothly changed in accordance with a function (column 6, lines 1-15). Furthermore, the examiner would like to point out that it is always possible to compute the average of a function f(x) over a range, namely

$$\langle f(x) \rangle = \frac{\int_a^b f(x)dx}{b-a}$$

where a, b define the range over which the average is to be determined. The average would simply be a constant (a number) over this entire range [a,b]. Applying this concept to the radiation intensity distribution, the range [a,b] would define the range of the scan.

Accordingly, the rejections are to be maintained.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen C. Ho whose telephone number is (571) 272-2491. The examiner can normally be reached on Monday - Friday from 8:00 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward J. Glick can be reached at (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Patent Examiner
Art Unit 2882

ACH

EDWARD J. GLICK
SUPERVISORY PATENT EXAMINER